

NOTICE

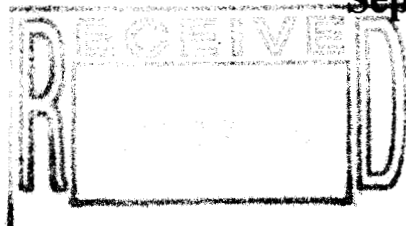
All drawings located at the end of the document.



**Draft Data Summary Report
IHSS Group 400-2
UBC 440 – Modification Center**



September 2004



ARMED DANGER

IA-A-002338

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Approval received from the Colorado Department of Public Health and Environment
().
Approval letter contained in the Administrative Record

September 2004

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ENCLOSURE

Compact Disk Containing Standardized Real and Quality Control Data

ACRONYMS

AAESE	Accelerated Action Ecological Screening Evaluation
AL	action level
AR	Administrative Record
ASD	Analytical Services Division
CAS	Chemical Abstract Service
CD	compact disk
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CRA	Comprehensive Risk Assessment
DOE	U.S. Department of Energy
DQA	Data Quality Assessment
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FY	Fiscal Year
HPGe	high purity germanium
HRR	Historical Release Report
IA	Industrial Area
IASAP	Industrial Area Sampling and Analysis Plan
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Plan
K-H	Kaiser-Hill Company, L.L.C.
LCS	laboratory control sample
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
NFAA	No Further Accelerated Action
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
pCi/g	picocuries per gram
QC	Quality Control
RFCA	Rocky Flats Cleanup Agreement
RFETS or Site	Rocky Flats Environmental Technology Site
RL	reporting limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
Sbd	sample beginning depth
Sed	sample ending depth

SOR	sum of ratios
SSRS	Subsurface Soil Risk Screen
SWD	Soil Water Database
UBC	Under Building Contamination
V&V	verification and validation
VOC	volatile organic compound
WRW	wildlife refuge worker

1.0 INTRODUCTION

This Data Summary Report summarizes characterization activities conducted at Individual Hazardous Substance Site (IHSS) Group 400-2 at the Rocky Flats Environmental Technology Site (RFETS or Site) in Golden, Colorado. Characterization activities were planned and executed in accordance with the Industrial Area (IA) Sampling and Analysis Plan (SAP) (IASAP) (DOE 2001) and IASAP Addendum IA#-04-01 (DOE 2003). Ecological effects will be evaluated in the Accelerated Action Ecological Screening Evaluation (AAESE) and the ecological risk assessment portion of the sitewide Comprehensive Risk Assessment (CRA).

IHSS Group 400-2 consists of one Under Building Contamination (UBC) site: UBC 440 – Modification Center. The location of IHSS Group 400-2 is shown on Figure 1.

Approval of this Data Summary Report constitutes regulatory agency concurrence of IHSS Group 400-2 as a No Further Accelerated Action (NFAA) Site. This information and NFAA determination will be documented in the Fiscal Year (FY) 2004 Historical Release Report (HRR).

2.0 SITE CHARACTERIZATION

Characterization of IHSS Group 400-2 consists of historical knowledge (DOE 1992-2003), historical sampling data (DOE 2000 and 2003), and accelerated action sampling data. Accelerated action characterization sampling locations, as described in IASAP Addendum #IA-04-01 (DOE 2003), consisted of 20 locations (12 statistical locations and 8 biased locations). IHSS Group 400-2 analytical data are presented in the following sections. Characterization sampling locations and deviations from the planned sampling locations as described in IASAP Addendum #IA-04-01 (DOE 2003) are presented in Table 1. A summary of soil sampling and analyses is presented in Table 2.

The sampling locations and analytical results greater than background means plus two standard deviations or reporting limits (RLs) for UBC 440 are shown on Figures 2 and 3 and presented in Table 3, respectively. Analytical results indicate that arsenic is present in one sample collected at IHSS Group 400-2 at a concentration greater than the Rocky Flats Cleanup Agreement (RFCA) wildlife refuge worker (WRW) action level (AL) and is denoted in bold text in Table 3. No other contaminants were detected at levels greater than the WRW ALs.

Radionuclide and non-radionuclide sums of ratios (SORs) are listed in Tables 3 and 4, respectively. All analytical data are summarized, by analyte, in Tables 5 and 6. Real and Quality Control (QC) data are enclosed on a compact disc (CD). The CD contains standardized real and QC data (Chemical Abstracts Service [CAS] numbers, analyte names, and units).

Table 1
IHSS Group 400-2 Accelerated Action Characterization and Sampling Deviations

IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Proposed Northing	Proposed Easting	Actual Media	Actual Depth Interval	Actual Analytes	Comments/Deviations
UBC 440	BW34-002	748310.570	2082102.540	748296.401	2082104.638	surface soil	0.0 - 0.5'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 15-ft southeast because of utilities interference. Deeper interval could not be obtained because of refusal at 0.5 ft; however, all analyses were conducted.
	BW34-003	748230.570	2082068.370	748232.268	2082071.913	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.0'	metals, radionuclides, VOCs	As discussed in the August 26, 2004 contact record to the CDPHE, this statistical sample location was offset approximately 4-ft northeast due to an obstruction by a counter/wash basin in locker room. Deeper interval shortened because of refusal at 1.0 ft; however, all analyses were conducted.
	BW34-005	748349.320	2082061.340	748356.809	2082065.459	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.0'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 7-ft southwest to clear an electrical panel. Deeper interval shortened because of refusal at 1.0 ft; however, all analyses were conducted.
	BW34-006	748289.680	2082023.580	748292.675	2082032.734	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.5'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 10-ft southeast to clear a wall. Deeper interval shortened because of refusal at 1.5 ft; however, all analyses were conducted.
	BW34-007	748233.850	2082006.650	748228.542	2082000.009	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.0'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 9-ft northeast to avoid an electrical panel and high noise levels in compressor room. Deeper interval shortened because of refusal at 1.0 ft; however, all analyses were conducted.

IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Proposed Northing	Proposed Easting	Actual Media	Actual Depth Interval	Actual Analytes	Comments/Deviations
UBC 440	BW34-008	748339.320	2081990.560	748353.083	2081993.556	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.5'	metals, radionuclides, VOCs	As discussed in the August 26, 2004 contact record to the CDPHE, this statistical sample location was offset approximately 14-ft southwest to clear the fork truck battery area. Deeper interval shortened because of refusal at 1.5 ft; however, all analyses were conducted.
	BW34-009	748282.860	2081965.980	748288.949	2081960.831	surface soil	0.0 - 0.5'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 8-ft southeast to clear the permacon room. Deeper interval could not be obtained due to refusal at 0.5 ft; however, all analyses were conducted.
	BW34-014	748213.360	2081944.730	748211.808	2081943.515	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall.
	BW34-015	748211.788	2082006.192	748214.249	2082006.980	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall. As discussed in the August 26, 2004 contact record to the CDPHE, this location was offset approximately 4 ft-east due to a sewer drain.
	BW34-016	748214.239	2082079.961	748214.249	2082077.769	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall.
	BW34-017	748215.685	2082092.726	748214.859	2082093.635	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall.
	BW35-040	748366.280	2082171.929	748365.589	2082132.080	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall. As discussed in the August 26, 2004 contact record to the CDPHE, this location was offset approximately 3 ft-west due to alarm lines.

IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Proposed Northing	Proposed Easting	Actual Media	Actual Depth Interval	Actual Analytes	Comments/Deviations
UBC 440	BW35-041	748366.248	2082064.705	748364.979	2082053.969	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall. As discussed in the August 26, 2004 contact record to the CDPHE, this location was offset approximately 3-ft northeast due to an electrical conduit.
	BW35-042	748365.062	2081939.799	748364.979	2081943.515	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall.
	BX34-002	748249.010	2082217.120	748239.720	2082215.720	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.5'	metals, radionuclides, VOCs	As discussed in the August 26, 2004 contact record to the CDPHE, this statistical sample location was offset approximately 9-ft north to clear equipment in the room. Deeper interval shortened because of refusal at 1.5 ft; however, all analyses were conducted.
	BX34-004	748297.180	2082179.000	748300.127	2082176.541	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.0'	metals, radionuclides, VOCs	As discussed in the August 26, 2004 contact record to the CDPHE, this statistical sample location was offset approximately 4-ft southeast due to an electrical conduit. Deeper interval shortened because of refusal at 1.0 ft; however, all analyses were conducted.
	BX34-005	748240.620	2082137.440	748235.994	2082143.816	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.5'	metals, radionuclides, VOCs	As discussed in the August 26, 2004 contact record to the CDPHE, this statistical sample was offset approximately 8-ft northwest due to proximity to the forklift area. Deeper interval shortened because of refusal at 1.5 ft; however, all analyses were conducted.
	BX34-006	748357.290	2082134.750	748360.535	2082137.363	surface and subsurface soil	0.0 - 0.5' 0.5 - 1.5'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 4-ft southwest to clear a footer and berm. Deeper interval shortened because of refusal at 1.5 ft; however, all analyses were conducted.
	BX34-008	748230.842	2082224.378	748216.690	2082210.802	surface and subsurface soil	0.0 - 0.5' 0.5 - 2.5'	metals, radionuclides, VOCs	Biased sample to target roof drain outfall. As discussed in the August 26, 2004 contact record to the CDPHE, this location was offset approximately 20 ft northeast to the roof drain.

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IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Proposed Northing	Proposed Easting	Actual Media	Actual Depth Interval	Actual Analytes	Comments/Deviations
UBC 440	BX35-027	748365.880	2082209.450	748364.261	2082209.266	surface and subsurface soil	0.0 – 0.5' 0.5 – 2.5'	metals, radionuclides, VOCs	As discussed in the April 1 and August 26, 2004 contact records to the CDPHE, this statistical sample location was offset approximately 4-ft west due to alarm lines.

VOC – volatile organic compound

Table 2
IHSS Group 400-2 Accelerated Action Sampling and Analysis Summary

Category	Planned Total	Actual Total
Number of Sampling Locations	20	20
Number of Samples	40	38
Number of Radionuclide Analyses	40	38
Number of Metal Analyses	40	38
Number of VOC Analyses	40	38

Table 3
IHSS Group 400-2 Results Greater Than Background Means Plus Two Standard Deviations or RLs

IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Depth Start (ft)	Depth End (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
UBC 440	BW34-002	748310.570	2082102.540	0.00	0.50	Chromium	20.000	268.0	16.990	-	mg/kg
	BW34-002	748310.570	2082102.540	0.00	0.50	Lithium	13.000	20,400.0	11.550	-	mg/kg
	BW34-002	748310.570	2082102.540	0.00	0.50	Uranium-234	2.973	300.0	2.253	-	pCi/g
	BW34-002	748310.570	2082102.540	0.00	0.50	Uranium-238	2.973	351.0	2.000	-	pCi/g
	BW34-003	748230.570	2082068.370	0.00	0.50	Chromium	24.000	268.0	16.990	-	mg/kg
	BW34-003	748230.570	2082068.370	0.00	0.50	Copper	23.000	40,900.0	18.060	-	mg/kg
	BW34-003	748230.570	2082068.370	0.00	0.50	Lithium	14.000	20,400.0	11.550	-	mg/kg
	BW34-003	748230.570	2082068.370	0.00	0.50	Nickel	16.000	20,400.0	14.910	-	mg/kg
	BW34-003	748230.570	2082068.370	0.00	0.50	Uranium-234	4.251	300.0	2.253	-	pCi/g
	BW34-003	748230.570	2082068.370	0.00	0.50	Uranium-238	4.251	351.0	2.000	-	pCi/g
	BW34-003	748230.570	2082068.370	0.50	1.00	Uranium-235	0.128	8.0	0.120	-	pCi/g
	BW34-005	748349.320	2082061.340	0.00	0.50	Uranium-235	0.170	8.0	0.094	-	pCi/g
	BW34-005	748349.320	2082061.340	0.50	1.00	Uranium-235	0.158	8.0	0.120	-	pCi/g
	BW34-005	748349.320	2082061.340	0.50	1.00	Uranium-238	1.563	351.0	1.490	-	pCi/g
	BW34-006	748289.680	2082023.580	0.00	0.50	Antimony	0.480	409.0	0.470	-	mg/kg
	BW34-006	748289.680	2082023.580	0.00	0.50	Chromium	17.000	268.0	16.990	-	mg/kg
	BW34-006	748289.680	2082023.580	0.00	0.50	Cobalt	47.000	1,550.0	10.910	-	mg/kg
	BW34-006	748289.680	2082023.580	0.00	0.50	Copper	120.000	40,900.0	18.060	-	mg/kg
	BW34-006	748289.680	2082023.580	0.00	0.50	Tin	12.000	613,000.0	2.900	-	mg/kg
	BW34-006	748289.680	2082023.580	0.00	0.50	Uranium-235	0.133	8.0	0.094	-	pCi/g
	BW34-006	748289.680	2082023.580	0.00	0.50	Uranium-238	2.222	351.0	2.000	-	pCi/g
	BW34-006	748289.680	2082023.580	0.50	1.50	Cobalt	31.000	1,550.0	29.040	-	mg/kg
	BW34-006	748289.680	2082023.580	0.50	1.50	Copper	83.000	40,900.0	38.210	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Aluminum	20,000.000	228,000.0	16,902.000	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Beryllium	1.100	921.0	0.966	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Chromium	23.000	268.0	16.990	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Copper	20.000	40,900.0	18.060	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Lithium	15.000	20,400.0	11.550	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Nickel	16.000	20,400.0	14.910	-	mg/kg
	BW34-007	748233.850	2082006.650	0.00	0.50	Uranium-234	3.614	300.0	2.253	-	pCi/g
	BW34-007	748233.850	2082006.650	0.00	0.50	Uranium-238	3.614	351.0	2.000	-	pCi/g
	BW34-007	748233.850	2082006.650	0.50	1.00	Uranium-234	4.033	300.0	2.640	-	pCi/g
	BW34-007	748233.850	2082006.650	0.50	1.00	Uranium-235	0.184	8.0	0.120	-	pCi/g

IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Depth Start (ft)	Depth End (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
UBC 440	BW34-007	748233.850	2082006.650	0.50	1.00	Uranium-238	4.033	351.0	1.490	-	pCi/g
	BW34-008	748339.320	2081990.560	0.00	0.50	Antimony	1.400	409.0	0.470	-	mg/kg
	BW34-008	748339.320	2081990.560	0.00	0.50	Arsenic	12.000	22.2	10.090	-	mg/kg
	BW34-008	748339.320	2081990.560	0.00	0.50	Barium	290.000	26,400.0	141.260	-	mg/kg
	BW34-008	748339.320	2081990.560	0.00	0.50	Copper	27.000	40,900.0	18.060	-	mg/kg
	BW34-008	748339.320	2081990.560	0.00	0.50	Uranium-235	0.143	8.0	0.094	-	pCi/g
	BW34-008	748339.320	2081990.560	0.50	1.50	Uranium-235	0.159	8.0	0.120	-	pCi/g
	BW34-009	748282.860	2081965.980	0.00	0.50	Antimony	0.750	409.0	0.470	-	mg/kg
	BW34-009	748282.860	2081965.980	0.00	0.50	Chromium	37.000	268.0	16.990	-	mg/kg
	BW34-009	748282.860	2081965.980	0.00	0.50	Cobalt	17.000	1,550.0	10.910	-	mg/kg
	BW34-009	748282.860	2081965.980	0.00	0.50	Copper	45.000	40,900.0	18.060	-	mg/kg
	BW34-009	748282.860	2081965.980	0.00	0.50	Nickel	21.000	20,400.0	14.910	-	mg/kg
	BW34-009	748282.860	2081965.980	0.00	0.50	Uranium-234	2.766	300.0	2.253	-	pCi/g
	BW34-009	748282.860	2081965.980	0.00	0.50	Uranium-235	0.242	8.0	0.094	-	pCi/g
	BW34-009	748282.860	2081965.980	0.00	0.50	Uranium-238	2.766	351.0	2.000	-	pCi/g
	BW34-014	748213.360	2081944.730	0.00	0.50	Copper	22.000	40,900.0	18.060	-	mg/kg
	BW34-014	748213.360	2081944.730	0.00	0.50	Iron	23,000.000	307,000.0	18,037.000	-	mg/kg
	BW34-014	748213.360	2081944.730	0.00	0.50	Lithium	12.000	20,400.0	11.550	-	mg/kg
	BW34-014	748213.360	2081944.730	0.00	0.50	Manganese	370.000	3,480.0	365.080	-	mg/kg
	BW34-014	748213.360	2081944.730	0.50	2.50	Uranium-238	2.366	351.0	1.490	-	pCi/g
	BW34-015	748211.788	2082006.192	0.00	0.50	Acetone	16.000	102,000,000.0	-	5.300	ug/kg
	BW34-015	748211.788	2082006.192	0.00	0.50	Aluminum	18,000.000	228,000.0	16,902.000	-	mg/kg
	BW34-015	748211.788	2082006.192	0.00	0.50	Beryllium	1.200	921.0	0.966	-	mg/kg
	BW34-015	748211.788	2082006.192	0.00	0.50	Nickel	16.000	20,400.0	14.910	-	mg/kg
	BW34-015	748211.788	2082006.192	0.00	0.50	Trichloroethene	1.500	19,600.0	-	1.000	ug/kg
	BW34-015	748211.788	2082006.192	0.50	2.50	Acetone	6.100	102,000,000.0	-	5.000	ug/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Aluminum	20,000.000	228,000.0	16,902.000	-	mg/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Beryllium	0.980	921.0	0.966	-	mg/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Chromium	18.000	268.0	16.990	-	mg/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Iron	20,000.000	307,000.0	18,037.000	-	mg/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Lithium	14.000	20,400.0	11.550	-	mg/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Nickel	15.000	20,400.0	14.910	-	mg/kg
	BW34-016	748214.239	2082079.961	0.00	0.50	Uranium-234	3.422	300.0	2.253	-	pCi/g
	BW34-016	748214.239	2082079.961	0.00	0.50	Uranium-235	0.195	8.0	0.094	-	pCi/g
	BW34-016	748214.239	2082079.961	0.00	0.50	Uranium-238	3.422	351.0	2.000	-	pCi/g
	BW34-016	748214.239	2082079.961	0.50	2.50	Uranium-234	3.688	300.0	2.640	-	pCi/g

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IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Depth Start (ft)	Depth End (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
UBC 440	BW34-016	748214.239	2082079.961	0.50	2.50	Uranium-238	3.688	351.0	1.490	-	pCi/g
	BW34-017	748215.685	2082092.726	0.00	0.50	Aluminum	17,000.000	228,000.0	16,902.000	-	mg/kg
	BW34-017	748215.685	2082092.726	0.00	0.50	Nickel	15.000	20,400.0	14.910	-	mg/kg
	BW34-017	748215.685	2082092.726	0.00	0.50	Uranium-235	0.148	8.0	0.094	-	pCi/g
	BW34-017	748215.685	2082092.726	0.00	0.50	Xylene	21.700	2,040,000.0	-	11.400	ug/kg
	BW34-017	748215.685	2082092.726	0.50	2.50	Copper	42.000	40,900.0	38.210	-	mg/kg
	BW34-017	748215.685	2082092.726	0.50	2.50	Uranium-238	1.612	351.0	1.490	-	pCi/g
	BW35-040	748366.280	2082171.929	0.00	0.50	Uranium-234	4.536	300.0	2.253	-	pCi/g
	BW35-040	748366.280	2082171.929	0.00	0.50	Uranium-235	0.267	8.0	0.094	-	pCi/g
	BW35-040	748366.280	2082171.929	0.00	0.50	Uranium-238	4.536	351.0	2.000	-	pCi/g
	BW35-040	748366.280	2082171.929	0.00	0.50	Zinc	82.000	307,000.0	73.760	-	mg/kg
	BW35-040	748366.280	2082171.929	0.50	2.50	Uranium-234	4.453	300.0	2.640	-	pCi/g
	BW35-040	748366.280	2082171.929	0.50	2.50	Uranium-235	0.194	8.0	0.120	-	pCi/g
	BW35-040	748366.280	2082171.929	0.50	2.50	Uranium-238	4.453	351.0	1.490	-	pCi/g
	BW35-041	748366.248	2082064.705	0.00	0.50	Uranium-234	3.662	300.0	2.253	-	pCi/g
	BW35-041	748366.248	2082064.705	0.00	0.50	Uranium-238	3.662	351.0	2.000	-	pCi/g
	BW35-041	748366.248	2082064.705	0.50	2.50	Uranium-234	4.864	300.0	2.640	-	pCi/g
	BW35-041	748366.248	2082064.705	0.50	2.50	Uranium-235	0.215	8.0	0.120	-	pCi/g
	BW35-042	748365.062	2081939.799	0.00	0.50	Uranium-238	4.864	351.0	1.490	-	pCi/g
	BW35-042	748365.062	2081939.799	0.00	0.50	Aluminum	30,000.000	228,000.0	16,902.000	-	mg/kg
	BW35-042	748365.062	2081939.799	0.00	0.50	Beryllium	1.800	921.0	0.966	-	mg/kg
	BW35-042	748365.062	2081939.799	0.00	0.50	Chromium	23.000	268.0	16.990	-	mg/kg
	BW35-042	748365.062	2081939.799	0.00	0.50	Lithium	13.000	20,400.0	11.550	-	mg/kg
	BW35-042	748365.062	2081939.799	0.00	0.50	Mercury	0.460	25,200.0	0.134	-	mg/kg
	BW35-042	748365.062	2081939.799	0.00	0.50	Nickel	19.000	20,400.0	14.910	-	mg/kg
	BW35-042	748365.062	2081939.799	0.00	0.50	Uranium-234	2.328	300.0	2.253	-	pCi/g
	BW35-042	748365.062	2081939.799	0.00	0.50	Uranium-235	0.152	8.0	0.094	-	pCi/g
	BW35-042	748365.062	2081939.799	0.00	0.50	Uranium-238	2.328	351.0	2.000	-	pCi/g
	BW35-042	748365.062	2081939.799	0.50	2.50	Arsenic	28.000	22.2	13.140	-	mg/kg
	BW35-042	748365.062	2081939.799	0.50	2.50	Barium	310.000	26,400.0	289.380	-	mg/kg
	BW35-042	748365.062	2081939.799	0.50	2.50	Uranium-235	0.163	8.0	0.120	-	pCi/g
	BX34-002	748249.010	2082217.120	0.00	0.50	Copper	27.000	40,900.0	18.060	-	mg/kg
	BX34-002	748249.010	2082217.120	0.00	0.50	Iron	20,000.000	307,000.0	18,037.000	-	mg/kg
	BX34-002	748249.010	2082217.120	0.00	0.50	Manganese	450.000	3,480.0	365.080	-	mg/kg
	BX34-002	748249.010	2082217.120	0.50	1.50	Copper	42.000	40,900.0	38.210	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Aluminum	20,000.000	228,000.0	16,902.000	-	mg/kg

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IHSS, PAC, or UBC	Location Code	Actual Northing	Actual Easting	Depth Start (ft)	Depth End (ft)	Analyte	Result	WRW AL	Background Mean Plus 2 SD	RL	Unit
UBC 440	BX34-004	748297.180	2082179.000	0.00	0.50	Beryllium	1.000	921.0	0.966	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Chromium	24.000	268.0	16.990	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Cobalt	24.000	1,550.0	10.910	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Copper	56.000	40,900.0	18.060	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Lithium	14.000	20,400.0	11.550	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Nickel	19.000	20,400.0	14.910	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Tin	6.400	613,000.0	2.900	-	mg/kg
	BX34-004	748297.180	2082179.000	0.00	0.50	Uranium-234	4.661	300.0	2.253	-	pCi/g
	BX34-004	748297.180	2082179.000	0.00	0.50	Uranium-238	4.661	351.0	2.000	-	pCi/g
	BX34-005	748240.620	2082137.440	0.00	0.50	Cobalt	22.000	1,550.0	10.910	-	mg/kg
	BX34-005	748240.620	2082137.440	0.00	0.50	Copper	69.000	40,900.0	18.060	-	mg/kg
	BX34-005	748240.620	2082137.440	0.00	0.50	Tin	6.900	613,000.0	2.900	-	mg/kg
	BX34-005	748240.620	2082137.440	0.00	0.50	Uranium-235	0.114	8.0	0.094	-	pCi/g
	BX34-005	748240.620	2082137.440	0.50	1.50	Cobalt	32.000	1,550.0	29.040	-	mg/kg
	BX34-005	748240.620	2082137.440	0.50	1.50	Copper	99.000	40,900.0	38.210	-	mg/kg
	BX34-005	748240.620	2082137.440	0.50	1.50	Uranium-235	0.170	8.0	0.120	-	pCi/g
	BX34-005	748240.620	2082137.440	0.50	1.50	Uranium-238	1.619	351.0	1.490	-	pCi/g
	BX34-006	748357.290	2082134.750	0.50	1.50	Americium-241	0.066	76.0	0.020	-	pCi/g
	BX34-006	748357.290	2082134.750	0.50	1.50	Plutonium-239/240	0.069	50.0	0.020	-	pCi/g
	BX34-008	748230.842	2082224.378	0.00	0.50	Aluminum	19,000.000	228,000.0	16,902.000	-	mg/kg
	BX34-008	748230.842	2082224.378	0.00	0.50	Beryllium	1.100	921.0	0.966	-	mg/kg
	BX34-008	748230.842	2082224.378	0.00	0.50	Lithium	13.000	20,400.0	11.550	-	mg/kg
	BX34-008	748230.842	2082224.378	0.00	0.50	Nickel	16.000	20,400.0	14.910	-	mg/kg
	BX34-008	748230.842	2082224.378	0.50	2.50	Uranium-234	3.359	300.0	2.640	-	pCi/g
	BX34-008	748230.842	2082224.378	0.50	2.50	Uranium-238	3.359	351.0	1.490	-	pCi/g
	BX35-027	748365.880	2082209.450	0.00	0.50	Aluminum	19,000.000	228,000.0	16,902.000	-	mg/kg
	BX35-027	748365.880	2082209.450	0.00	0.50	Beryllium	0.970	921.0	0.966	-	mg/kg
	BX35-027	748365.880	2082209.450	0.00	0.50	Lithium	13.000	20,400.0	11.550	-	mg/kg
	BX35-027	748365.880	2082209.450	0.00	0.50	Uranium-235	0.140	8.0	0.094	-	pCi/g

Bold denotes AL exceedance

Italic type denotes values derived from HPGe measurement

2.1 Analytical Results

Analytical results indicate that one analyte was detected at a concentration above the WRW AL in IHSS Group 400-2. The 0.5 to 2.5 feet interval from sample BW35-042, located outside the northwest corner of Building 440, contained arsenic at a concentration of 28.0 milligrams per kilogram (mg/kg) (Figure 3 and Table 3). The WRW AL for arsenic is 22.2 mg/kg.

2.2 Sum of Ratios

Radionuclide SORs for surface soil (0 to 3 ft) radionuclides were calculated for IHSS Group 400-2 sampling locations based on the accelerated action analytical data for the contaminants of concern (COCs) and WRW ALs. Radionuclide SORs were calculated for all locations with analytical results greater than background means plus two standard deviations for americium-241, plutonium-239/241, uranium-234, uranium-235, and uranium-238. Plutonium-239/240 activities are derived from americium-241 activities (that is, plutonium-239/240 activity = americium-241 gamma spectroscopy activity x 5.7) when americium-241 is measured using high-purity germanium (HPGe) detection analysis. SORs for radionuclides are presented in Table 3. As shown, all SORs for radionuclides in surface soil are less than 1.

SORs for non-radionuclides were calculated for all surface soil locations where analyte concentrations were 10 percent or more of a contaminant's WRW AL. Special consideration will be given to certain chemicals due to their widespread natural occurrence and/or because of the lack of process knowledge of their use at the Site. The arsenic WRW AL is just above the background level, so that including it may skew the results of SOR calculations. In addition, measured concentrations of aluminum, iron, and manganese exceed WRW ALs at a high number of sample locations. Occurrences of PAHs are presumed to be related to asphalt at most locations. Therefore, SOR calculations will not include any of these chemicals to avoid masking genuine contaminants and misidentifying areas of concern. Only validated data meeting current DQOs will be used to calculate SORs. SORs for non-radionuclides are presented in Table 4. As shown, all SORs for non-radionuclides in surface soil are less than 1.

Table 3
IHSS Group 400-2 RFCA SORs for Surface Soil
Radionuclide Activities

Location	Start Depth	End Depth	SOR
BW34-002	0.00	0.50	0.018
BW34-003	0.00	0.50	0.026
BW34-003	0.50	1.00	0.016
BW34-005	0.00	0.50	0.021
BW34-005	0.50	1.00	0.024
BW34-006	0.00	0.50	0.023
BW34-007	0.00	0.50	0.022
BW34-007	0.50	1.00	0.048
BW34-008	0.00	0.50	0.018
BW34-008	0.50	1.50	0.020

Location	Start Depth	End Depth	SOR
BW34-009	0.00	0.50	0.047
BW34-014	0.50	2.50	0.007
BW34-016	0.00	0.50	0.046
BW34-016	0.50	2.50	0.023
BW34-017	0.00	0.50	0.018
BW34-017	0.50	2.50	0.005
BW35-040	0.00	0.50	0.061
BW35-040	0.50	2.50	0.052
BW35-041	0.00	0.50	0.023
BW35-041	0.50	2.50	0.057
BW35-042	0.00	0.50	0.033
BW35-042	0.50	2.50	0.020
BX34-004	0.00	0.50	0.029
BX34-005	0.00	0.50	0.014
BX34-005	0.50	1.50	0.026
BX34-006	0.50	1.50	0.001
BX34-008	0.50	2.50	0.021
BX35-027	0.00	0.50	0.017

Table 4
IHSS Group 400-2 RFCA SORs for Surface Soil
Non-Radionuclide Concentrations

Location	Start Depth	End Depth	SOR
BW34-009	0.00	0.50	0.138

2.3 Summary Statistics

Summary statistics, by analyte, were calculated for the IHSS Group 400-2 sampling locations (Tables 5 and 6). These summaries are based on detected concentrations only.

Table 5
Surface Soil Summary Statistics

Analyte	Number of Samples	Detection Frequency	Average Concentration	Maximum Concentration	WRW AL	Bkg + 2SD	Unit
Acetone	20	5.00%	16.000	16.000	102,000,000.0	-	ug/kg
Aluminum	20	40.00%	20,375.000	30,000.000	228,000.0	16,902.000	mg/kg
Antimony	20	15.00%	0.877	1.400	409.0	0.470	mg/kg
Arsenic	20	5.00%	12.000	12.000	22.2	10.090	mg/kg
Barium	20	5.00%	290.000	290.000	26,400.0	141.260	mg/kg
Beryllium	20	35.00%	1.164	1.800	921.0	0.966	mg/kg
Chromium	20	40.00%	23.250	37.000	268.0	16.990	mg/kg
Cobalt	20	20.00%	27.500	47.000	1,550.0	10.910	mg/kg
Copper	20	45.00%	45.444	120.000	40,900.0	18.060	mg/kg
Iron	20	15.00%	21,000.000	23,000.000	307,000.0	18,037.000	mg/kg
Lithium	20	45.00%	13.444	15.000	20,400.0	11.550	mg/kg
Manganese	20	10.00%	410.000	450.000	3,480.0	365.080	mg/kg
Mercury	20	5.00%	0.460	0.460	25,200.0	0.134	mg/kg
Nickel	20	45.00%	17.000	21.000	20,400.0	14.910	mg/kg
Tin	20	15.00%	8.433	12.000	613,000.0	2.900	mg/kg

Analyte	Number of Samples	Detection Frequency	Average Concentration	Maximum Concentration	WRW AL	Bkg + 2SD	Unit
Trichloroethene	20	5.00%	1.500	1.500	19,600.0	-	ug/kg
Uranium-234	20	45.00%	3.579	4.661	300.0	2.253	pCi/g
Uranium-235	20	50.00%	0.170	0.267	8.0	0.094	pCi/g
Uranium-238	20	50.00%	3.444	4.661	351.0	2.000	pCi/g
Xylene	20	5.00%	21.700	21.700	2,040,000.0	-	ug/kg
Zinc	20	5.00%	82.000	82.000	307,000.0	73.760	mg/kg

Table 6
Subsurface Soil Summary Statistics

Analyte	Number of Samples	Detection Frequency	Average Concentration	Maximum Concentration	WRW AL	Bkg + 2SD	Unit
Acetone	18	5.56%	6.100	6.100	102,000,000.0	-	ug/kg
Americium-241	18	5.56%	0.066	0.066	76.0	0.020	pCi/g
Arsenic	18	5.56%	28.000	28.000	22.2	13.140	mg/kg
Barium	18	5.56%	310.000	310.000	26,400.0	289.380	mg/kg
Cobalt	18	11.11%	31.500	32.000	1,550.0	29.040	mg/kg
Copper	18	22.22%	66.500	99.000	40,900.0	38.210	mg/kg
Plutonium-239/240	18	5.56%	0.069	0.069	50.0	0.020	pCi/g
Uranium-234	18	27.78%	4.079	4.864	300.0	2.640	pCi/g
Uranium-235	18	44.44%	0.171	0.215	8.0	0.120	pCi/g
Uranium-238	18	50.00%	3.062	4.864	351.0	1.490	pCi/g

2.4 Discussion

Analytical results from soil sampling at IHSS Group 400-2 indicate that one detection of arsenic in subsurface soil (0.50 to 2.50 feet) was reported at a concentration above the WRW AL at sample location BW34-008. All remaining detections of analytes were below (generally less than one-tenth) their respective WRW ALs.

3.0 SUBSURFACE SOIL RISK SCREEN

The Subsurface Soil Risk Screen (SSRS) follows the steps identified on Figure 3 in Attachment 5 of RFCA (DOE et al. 2003):

Screen 1 – Are the contaminant of concern (COC) concentrations below Table 3 WRW Soil Action Levels?

No. Arsenic was detected in subsurface soil at a concentration above the WRW AL at one location.

Screen 2 – Is there potential for subsurface soil to become surface soil (landslide and erosion areas identified on Figure 1)?

No. IHSS Group 400-2 is not located in an area subject to erosion or landslides in accordance with Figure 1 of RFCA (DOE et al. 2003).

Screen 3 – Does subsurface soil radiological contamination exceed criteria in Section 5.3?

No.

Screen 4 – Is there an environmental pathway and sufficient quantity of COCs that would cause exceedance of the surface water standards?

No. Although contaminant migration via erosion and groundwater are the two possible pathways whereby surface water could become contaminated from IHSS Group 400-2 soil or structures, accelerated action soil data indicate that there are not sufficient concentrations of contaminants to cause exceedances of surface water standards. Runoff from IHSS Group 400-2 flows through gauging stations GS22 and GS38 (DOE 2002a). The nearest downgradient RFCA surface water Points of Evaluation (POEs) are SW027 and GS10 (DOE 2002a). These POEs have had reported exceedances of water quality standards; however, both SW027 and GS10 receive water from a large part of the IA, and surface water quality at these locations may not be attributable to any single upgradient IHSS Group.

Two groundwater monitoring wells are located near IHSS Group 400-2: P416689 and P416789. Well P416689 is considered a plume extent well and well P416789 is considered a plume definition well. Both wells contained uranium-233/234 and uranium-238 concentrations that exceeded the RFCA Tier II groundwater ALs but were below background means plus two standard deviations (DOE 2002b).

The volatile organic compound (VOC) plume dissects the northeast portion of IHSS Group 400-2. However, this plume is much larger than the IHSS Group and is attributed to multiple sources within the IA. Results of VOC analyses at IHSS Group 400-2 do not indicate a potential source in this area.

4.0 NO FURTHER ACCELERATED ACTION SUMMARY

Based upon the SSRS, NFAA is justified for IHSS Group 400-2 because of the following:

- The isolated exceedance of arsenic was only slightly above the WRW AL.
- Migration of contaminants to surface water through erosion is unlikely because the area is not prone to landslides or erosion.
- Migration of contaminants in groundwater will not likely impact surface water because of the low levels of soil contamination found in IHSS Group 400-2. The Integrated Monitoring Plan (IMP) will address the need for further groundwater monitoring. Groundwater remediation alternatives will be addressed in the Groundwater Interim Measure/Interim Remedial Action (IM/IRA).

Approval of this Data Summary Report constitutes regulatory agency concurrence of this IHSS Group as an NFAA. This information and NFAA determination will be documented in the FY04 HRR. Ecological factors will be evaluated in the CRA.

5.0 DATA QUALITY ASSESSMENT

The Data Quality Objectives (DQOs) for this project are described in the IASAP (DOE 2003). All DQOs for this project were achieved based on the following:

- Regulatory agency-approved sampling program design (IASAP Addendum #IA-04-01 [DOE 2003]), modified, due to field conditions, in accordance with the IASAP (DOE 2001);
- Collection of samples in accordance with the IASAP (DOE 2001); and
- Results of the Data Quality Assessment (DQA) as described in the following sections.

5.1 Data Quality Assessment Process

The DQA process ensures that the type, quantity and quality of environmental data used in decision making are defensible, and is based on the following guidance and requirements:

- U.S. Environmental Protection Agency (EPA) QA/G-4, 1994a, Guidance for the Data Quality Objective Process;
- EPA QA/G-9, 1998, Guidance for the Data Quality Assessment Process, Practical Methods for Data Analysis; and
- U.S. Department of Energy (DOE) Order 414.1A, 1999, Quality Assurance.

Verification and validation (V&V) of data are the primary components of the DQA. The final data are compared with original project DQOs and evaluated with respect to project decisions; uncertainty within the decisions; and quality criteria required for the data, specifically precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). Validation criteria are consistent with the following RFETS-specific documents and industry guidelines:

- EPA 540/R-94/012, 1994b, U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review;
- EPA 540/R-94/013, 1994c, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review;
- Kaiser-Hill Company, L.L.C. (K-H) V&V Guidelines:

- General Guidelines for Data Verification and Validation, DA-GR01-v1, 2002a
 - V&V Guidelines for Isotopic Determinations by Alpha Spectrometry, DA-RC01-v2, 2002b
 - V&V Guidelines for Volatile Organics, DA-SS01-v3, 2002c
 - V&V Guidelines for Semivolatile Organics, DA-SS02-v3, 2002d
 - V&V Guidelines for Metals, DA-SS05-v3, 2002e
- Lockheed-Martin, 1997, Evaluation of Radiochemical Data Usability, ES/ER/MS-5.

This report will be submitted to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Record (AR) for permanent storage 30 days after being provided to the Colorado Department of Public Health and Environment (CDPHE) and/or EPA.

5.2 Verification and Validation of Results

Verification ensures that data produced and used by the project are documented and traceable in accordance with quality requirements. Validation consists of a technical review of all data that directly support the project decisions so that any limitations of the data relative to project goals are delineated and the associated data are qualified. The V&V process defines the criteria that constitute data quality, namely PARCCS parameters. Data traceability and archival are also addressed. V&V criteria include the following:

- Chain-of-custody;
- Preservation and hold times;
- Instrument calibrations;
- Preparation blanks;
- Interference check samples (metals);
- Matrix spikes/matrix spike duplicates (MS/MSDs);
- Laboratory control samples (LCSs);
- Field duplicate measurements;
- Chemical yield (radiochemistry);
- Required quantitation limits/minimum detectable activities (sensitivity of chemical and radiochemical measurements, respectively); and
- Sample analysis and preparation methods.

Evaluation of V&V criteria ensures that PARCCS parameters are satisfactory (i.e., within tolerances acceptable to the project). Satisfactory V&V of laboratory quality controls are captured through application of validation “flags” or qualifiers to individual records.

Raw hard-copy data (for example, individual analytical data packages) are currently filed by report identification number and maintained by K-H Analytical Services Division (ASD). Older hard copies may reside in the Federal Center in Lakewood, Colorado.

Electronic data are stored in the RFETS Soil Water Database (SWD). Standardized real and QC data are included on the enclosed CD.

5.2.1 Accuracy

The following measures of accuracy were evaluated:

- LCSs;
- Surrogates;
- Field blanks; and
- Sample MSs.

Results are compared to method requirements and project goals. The results of these comparisons are summarized for RFCA COCs where the result could impact project decisions. Particular attention is paid to those values near ALs when QC results could indicate unacceptable levels of uncertainty for decision-making purposes.

Laboratory Control Sample Evaluation

The frequency of LCS measurements is presented in Table 7. LCS analyses were run for all methods except for gamma spectroscopy. The onsite laboratories are not required to provide this data.

Table 7
LCS Frequency

Test Method Name	Laboratory Batch	Laboratory Control Standards
Alpha Spectroscopy	359561	Yes
Alpha Spectroscopy	359563	Yes
Alpha Spectroscopy	359569	Yes
Alpha Spectroscopy	360848	Yes
Alpha Spectroscopy	360860	Yes
Alpha Spectroscopy	363834	Yes
SW-846 6010	4232615	Yes
SW-846 6010	4232617	Yes
SW-846 6010	4233189	Yes
SW-846 6010	4233195	Yes
SW-846 6010	4237646	Yes
SW-846 6010	4243162	Yes
SW-846 8260	4233251	Yes
SW-846 8260	4240443	Yes
SW-846 8260	MS1 VOA 040816B	Yes
SW-846 8260	MS1 VOA 040820A	Yes
SW-846 8260	MS1 VOA 040823A	Yes
SW-846 8260	MS3 VOA 040816B	Yes
SW-846 8260	MS3 VOA 040823A	Yes
SW-846 8260	MS3 VOA 040824A	Yes

Minimum and maximum LCS results are tabulated by chemical for the entire project in Table 8. LCS results that were outside of tolerances were reviewed to determine whether a potential bias might be indicated. LCS recoveries are not indicative of matrix effects

because they are not prepared using Site samples. LCS results do indicate whether the laboratory may be introducing a bias in the results. Recoveries reported above the upper limit may indicate the actual sample results are less than reported. Because this is environmentally conservative, no further action is needed.

Potentially unacceptable low LCS recoveries were evaluated in the following manner. If the maximum sample result divided by the lowest LCS recovery for that analyte is less than the WRW AL, no further action is taken because any indicated bias is not great enough to affect project decisions. All metal and VOC LCS recoveries for IHSS Group 400-2 passed the criterion; therefore, LCS recoveries did not impact project decisions.

Any qualifications of individual results because the LCS performance exceeding upper or lower tolerance limits are also captured in the V&V flags, described in Section 5.2.3.

Table 8
LCS Evaluation Summary

Test Method Name	CAS Number	Analyte	Min Result	Max Result	Result Unit
SW-846 8260	71-55-6	1,1,1-Trichloroethane	78.57	107	%REC
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	89	111.4	%REC
SW-846 8260	79-00-5	1,1,2-Trichloroethane	94.11	104	%REC
SW-846 8260	75-34-3	1,1-Dichloroethane	86.39	102.9	%REC
SW-846 8260	75-35-4	1,1-Dichloroethene	91.17	111	%REC
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	79	111.3	%REC
SW-846 8260	95-50-1	1,2-Dichlorobenzene	84	105.9	%REC
SW-846 8260	107-06-2	1,2-Dichloroethane	79.63	110	%REC
SW-846 8260	78-87-5	1,2-Dichloropropane	86.76	109	%REC
SW-846 8260	106-46-7	1,4-Dichlorobenzene	81	107	%REC
SW-846 8260	78-93-3	2-Butanone	71.74	113	%REC
SW-846 8260	108-10-1	4-Methyl-2-pentanone	86.88	107	%REC
SW-846 8260	67-64-1	Acetone	71.43	127	%REC
SW-846 6010	7429-90-5	Aluminum	98	100	%REC
SW-846 6010	7440-36-0	Antimony	89	94	%REC
SW-846 6010	7440-38-2	Arsenic	88	93	%REC
SW-846 6010	7440-39-3	Barium	97	103	%REC
SW-846 8260	71-43-2	Benzene	87.81	106	%REC
SW-846 6010	7440-41-7	Beryllium	100	103	%REC
SW-846 8260	75-27-4	Bromodichloromethane	79.83	106	%REC
SW-846 8260	75-25-2	Bromoform	79.73	113	%REC
SW-846 8260	74-83-9	Bromomethane	72.97	121	%REC
SW-846 6010	7440-43-9	Cadmium	91	98	%REC
SW-846 8260	75-15-0	Carbon Disulfide	61	124.4	%REC
SW-846 8260	56-23-5	Carbon Tetrachloride	77.38	105	%REC
SW-846 8260	108-90-7	Chlorobenzene	89	105	%REC
SW-846 8260	75-00-3	Chloroethane	95.58	121	%REC
SW-846 8260	67-66-3	Chloroform	76.58	104	%REC
SW-846 8260	74-87-3	Chloromethane	85	120	%REC
SW-846 6010	7440-47-3	Chromium	94	100	%REC
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	83.61	107	%REC
SW-846 6010	7440-48-4	Cobalt	90	96	%REC
SW-846 6010	7440-50-8	Copper	91	96	%REC
SW-846 8260	124-48-1	Dibromochloromethane	89.45	105	%REC
SW-846 8260	100-41-4	Ethylbenzene	94	110.5	%REC
SW-846 8260	87-68-3	Hexachlorobutadiene	86	115	%REC
SW-846 6010	7439-89-6	Iron	99	101	%REC

Test Method Name	CAS Number	Analyte	Min Result	Max Result	Result Unit
SW-846 6010	7439-92-1	Lead	92	97	%REC
SW-846 6010	7439-93-2	Lithium	100	106	%REC
SW-846 6010	7439-96-5	Manganese	93	99	%REC
SW-846 6010	7439-97-6	Mercury	95	101	%REC
SW-846 8260	75-09-2	Methylene chloride	85.97	111	%REC
SW-846 6010	7439-98-7	Molybdenum	90	97	%REC
SW-846 8260	91-20-3	Naphthalene	88	107.4	%REC
SW-846 6010	7440-02-0	Nickel	92	98	%REC
SW-846 6010	7782-49-2	Selenium	88	92	%REC
SW-846 6010	7440-22-4	Silver	91	96	%REC
SW-846 6010	7440-24-6	Strontium	95	101	%REC
SW-846 8260	100-42-5	Styrene	92	109	%REC
SW-846 8260	127-18-4	Tetrachloroethene	80	107.8	%REC
SW-846 6010	7440-31-5	Tin	84	90	%REC
SW-846 8260	108-88-3	Toluene	91	111.1	%REC
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	97	114	%REC
SW-846 8260	79-01-6	Trichloroethene	83.72	111	%REC
SW-846 6010	11-09-6	Uranium, Total	95	100	%REC
SW-846 6010	7440-62-2	Vanadium	93	99	%REC
SW-846 8260	75-01-4	Vinyl chloride	80	126	%REC
SW-846 8260	1330-20-7	Xylene	91	110.1	%REC
SW-846 6010	7440-66-6	Zinc	87	97	%REC

Surrogate Evaluation

The frequency of surrogate measurements, relative to each laboratory batch, is given in Table 9. The minimum and maximum surrogate results are tabulated, by chemical, for the entire project. Surrogates are added to every VOC sample, and therefore, surrogate recoveries only impact individual samples. Unacceptable surrogate recoveries can indicate potential matrix effects. Surrogate recoveries reported above 100 percent may indicate the actual sample results are less than reported. Because this is environmentally conservative, no further action is needed. Therefore, only the lowest recoveries were evaluated. If the maximum sample result divided by the lowest surrogate recovery is less than the WRW AL for that analyte, no further action is taken because any indicated bias is not great enough to correct a false low sample result to one above the AL. All VOC analytes passed this criterion. Therefore, for IHSS Group 400-2 surrogate recoveries did not impact project decisions. Any qualifications of results due to surrogate results are captured in the V&V flags, described in Section 5.3.2.

Table 9
Surrogate Recovery Summary

VOC – Surrogate Recoveries				
Number of Samples	Analyte	Minimum Concentration	Maximum Concentration	Unit
38	4-Bromofluorobenzene	78.53	101.8	%REC
38	Deuterated 1,2-dichloroethane	77	138.5	%REC
38	Deuterated Toluene	83	108.1	%REC

Field Blank Evaluation

Results of the field blank analyses are shown in Table 10. Detectable (non-"U" laboratory qualified) amounts of contaminants within the blanks, which could indicate possible cross-contamination of samples, are evaluated if the same contaminant is detected in the associated real samples. Evaluation consists of multiplying the field blank results by 10 (for laboratory contaminants) or by 5 (for non-laboratory contaminants) and comparing them to the WRW ALs. To be conservative, a factor of 10 is used in this evaluation. When a corrected field blank result is less than the WRW AL the associated real results are considered acceptable. None of the chemicals were detected in the blanks at concentrations greater than one-tenth the WRW AL. Therefore, no impact on decisions due to blank contamination is indicated.

Table 10
Field Blank Summary

Sample QC Code	Laboratory	CAS No.	Analyte	Detected Result	Unit
FB	URS	56-23-5	Carbon Tetrachloride	36.2	ug/L
FB	URS	67-66-3	Chloroform	1.7	ug/L
FB	URS	15117-96-1	Uranium-235	0.143	pCi/g
RNS	URS	15117-96-1	Uranium-235	0.134	pCi/g
FB	URS	7440-61-1	Uranium-238	3.38	pCi/g
RNS	URS	7440-61-1	Uranium-238	2.53	pCi/g

Field blank (FB = field, RNS = rinse) results greater than detection limits (not U-qualified)

Sample Matrix Spike Evaluation

The minimum and maximum MS results are summarized by chemical for the project in Table 11. Organic analytes with unacceptably low matrix spike recoveries resulted in a review of the LCS recoveries. According to the EPA data validation guidelines (1994b), if organic MS recoveries are low, then the LCS recovery is to be checked and, if acceptable, no action is to be taken. Checks for organic analytes indicate the WRW AL was at least a factor of three times greater than the highest sample result; therefore, decisions were not impacted and no action was taken.

For inorganics with MS recoveries greater than zero, the maximum sample results were divided by the lowest percent recovery for each analyte. If the resulting number is less than the WRW AL, decisions were not impacted, and no action was taken. For this project, all results for inorganic analytes were acceptable. Iron had zero percent recovery as a low. For this analyte, the WRW AL was at least a factor of three times greater than the highest sample result; therefore, decisions were not impacted.

Table 11
Sample Matrix Spike Summary

Test Method Name	CAS No.	Analyte	Min of Result	Max of Result	Result Unit	Number of Samples	Number of Lab Batches
SW-846 8260	71-55-6	1,1,1-Trichloroethane	89	111.2	%REC	4	4
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	75.8	97.67	%REC	4	4
SW-846 8260	79-00-5	1,1,2-Trichloroethane	80.71	97.52	%REC	4	4
SW-846 8260	75-34-3	1,1-Dichloroethane	86	101.4	%REC	4	4
SW-846 8260	75-35-4	1,1-Dichloroethene	80.35	94.81	%REC	4	4
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	60.26	73.75	%REC	4	4
SW-846 8260	95-50-1	1,2-Dichlorobenzene	73	93.94	%REC	4	4
SW-846 8260	107-06-2	1,2-Dichloroethane	95.16	106.4	%REC	4	4
SW-846 8260	78-87-5	1,2-Dichloropropane	89.16	97.22	%REC	4	4
SW-846 8260	106-46-7	1,4-Dichlorobenzene	68.68	92.87	%REC	4	4
SW-846 8260	78-93-3	2-Butanone	71.03	114	%REC	4	4
SW-846 8260	108-10-1	4-Methyl-2-pentanone	88.21	103.5	%REC	4	4
SW-846 8260	67-64-1	Acetone	53.25	112.3	%REC	4	4
SW-846 6010	7429-90-5	Aluminum	1530	4690	%REC	2	2
SW-846 6010	7440-36-0	Antimony	46	54	%REC	2	2
SW-846 6010	7440-38-2	Arsenic	85	90	%REC	2	2
SW-846 6010	7440-39-3	Barium	96	99	%REC	2	2
SW-846 8260	71-43-2	Benzene	85.85	96.27	%REC	4	4
SW-846 6010	7440-41-7	Beryllium	97	99	%REC	2	2
SW-846 8260	75-27-4	Bromodichloromethane	95	106.3	%REC	4	4
SW-846 8260	75-25-2	Bromoform	82	104.5	%REC	4	4
SW-846 8260	74-83-9	Bromomethane	77	117.9	%REC	4	4
SW-846 6010	7440-43-9	Cadmium	87	92	%REC	2	2
SW-846 8260	75-15-0	Carbon Disulfide	52	73.77	%REC	4	4
SW-846 8260	56-23-5	Carbon Tetrachloride	84	111.4	%REC	4	4
SW-846 8260	108-90-7	Chlorobenzene	74	97.61	%REC	4	4
SW-846 8260	75-00-3	Chloroethane	78.8	94.27	%REC	4	4
SW-846 8260	67-66-3	Chloroform	94	110.1	%REC	4	4
SW-846 8260	74-87-3	Chloromethane	72.55	92.96	%REC	4	4
SW-846 6010	7440-47-3	Chromium	107	197	%REC	2	2
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	89.8	98.54	%REC	4	4
SW-846 6010	7440-48-4	Cobalt	85	89	%REC	2	2
SW-846 6010	7440-50-8	Copper	83	83	%REC	2	2
SW-846 8260	124-48-1	Dibromochloromethane	85	98.81	%REC	4	4
SW-846 8260	100-41-4	Ethylbenzene	70.9	90.05	%REC	4	4
SW-846 8260	87-68-3	Hexachlorobutadiene	52.99	70.26	%REC	4	4
SW-846 6010	7439-89-6	Iron	0	488	%REC	2	2
SW-846 6010	7439-92-1	Lead	83	92	%REC	2	2
SW-846 6010	7439-93-2	Lithium	103	106	%REC	2	2
SW-846 6010	7439-96-5	Manganese	97	119	%REC	2	2
SW-846 6010	7439-97-6	Mercury	92	96	%REC	2	2
SW-846 8260	75-09-2	Methylene chloride	89	98.95	%REC	4	4
SW-846 6010	7439-98-7	Molybdenum	85	90	%REC	2	2
SW-846 8260	91-20-3	Naphthalene	73.42	88.59	%REC	4	4
SW-846 6010	7440-02-0	Nickel	90	110	%REC	2	2
SW-846 6010	7782-49-2	Selenium	84	90	%REC	2	2
SW-846 6010	7440-22-4	Silver	87	88	%REC	2	2
SW-846 6010	7440-24-6	Strontium	89	95	%REC	2	2
SW-846 8260	100-42-5	Styrene	71.02	93.35	%REC	4	4
SW-846 8260	127-18-4	Tetrachloroethene	64	88.49	%REC	4	4
SW-846 6010	7440-31-5	Tin	80	84	%REC	2	2
SW-846 8260	108-88-3	Toluene	73.7	95.52	%REC	4	4

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Test Method Name	CAS No.	Analyte	Min of Result	Max of Result	Result Unit	Number of Samples	Number of Lab Batches
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	70.84	88	%REC	4	4
SW-846 8260	79-01-6	Trichloroethene	85	106.4	%REC	4	4
SW-846 6010	11-09-6	Uranium, Total	89	92	%REC	2	2
SW-846 6010	7440-62-2	Vanadium	92	99	%REC	2	2
SW-846 8260	75-01-4	Vinyl chloride	66	88.16	%REC	4	4
SW-846 8260	1330-20-7	Xylene	73.74	88.7	%REC	4	4
SW-846 6010	7440-66-6	Zinc	89	101	%REC	2	2

5.2.2 Precision

Precision is measured by evaluating both MSDs and field duplicates, as described in the following sections.

Sample Matrix Spike Duplicate Evaluation

Laboratory precision is measured through use of MSDs. Table 12 lists the maximum relative percent difference (RPD) for each analyte. Analytes with the highest RPDs (greater than 35 percent) were reviewed by comparing the highest sample result to the WRW AL. For analytes with RPDs greater than 35 percent, if the highest sample results were sufficiently below the ALs, no further action was needed. For this project, the reviews indicated decisions were not impacted. While several RPDs appear to be high, they did not result in rejection of data and did not affect project decisions.

Table 12
Sample Matrix Spike Duplicate Summary

Test Method Name	CAS No.	Analyte	Max of RPD (%)
SW-846 8260	71-55-6	1,1,1-Trichloroethane	16.12
SW-846 8260	79-34-5	1,1,2,2-Tetrachloroethane	6.38
SW-846 8260	79-00-5	1,1,2-Trichloroethane	10.06
SW-846 8260	75-34-3	1,1-Dichloroethane	16.04
SW-846 8260	75-35-4	1,1-Dichloroethene	31.06
SW-846 8260	120-82-1	1,2,4-Trichlorobenzene	23.78
SW-846 8260	95-50-1	1,2-Dichlorobenzene	19.75
SW-846 8260	107-06-2	1,2-Dichloroethane	7.62
SW-846 8260	78-87-5	1,2-Dichloropropane	15.38
SW-846 8260	106-46-7	1,4-Dichlorobenzene	20.51
SW-846 8260	78-93-3	2-Butanone	2.67
SW-846 8260	108-10-1	4-Methyl-2-pentanone	7.04
SW-846 8260	67-64-1	Acetone	6.81
SW-846 6010	7429-90-5	Aluminum	20.53
SW-846 6010	7440-36-0	Antimony	0.00
SW-846 6010	7440-38-2	Arsenic	3.47
SW-846 6010	7440-39-3	Barium	8.00
SW-846 8260	71-43-2	Benzene	16.49
SW-846 6010	7440-41-7	Beryllium	2.04
SW-846 8260	75-27-4	Bromodichloromethane	11.88
SW-846 8260	75-25-2	Bromoform	10.40
SW-846 8260	74-83-9	Bromomethane	15.57

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Test Method Name	CAS No.	Analyte	Max of RPD (%)
SW-846 6010	7440-43-9	Cadmium	4.49
SW-846 8260	75-15-0	Carbon Disulfide	25.73
SW-846 8260	56-23-5	Carbon Tetrachloride	21.20
SW-846 8260	108-90-7	Chlorobenzene	15.00
SW-846 8260	75-00-3	Chloroethane	22.13
SW-846 8260	67-66-3	Chloroform	12.94
SW-846 8260	74-87-3	Chloromethane	28.88
SW-846 6010	7440-47-3	Chromium	39.51
SW-846 8260	10061-01-5	cis-1,3-Dichloropropene	14.14
SW-846 6010	7440-48-4	Cobalt	4.60
SW-846 6010	7440-50-8	Copper	29.74
SW-846 8260	124-48-1	Dibromochloromethane	7.91
SW-846 8260	100-41-4	Ethylbenzene	15.95
SW-846 8260	87-68-3	Hexachlorobutadiene	27.40
SW-846 6010	7439-89-6	Iron	142.04
SW-846 6010	7439-92-1	Lead	8.09
SW-846 6010	7439-93-2	Lithium	1.87
SW-846 6010	7439-96-5	Manganese	82.78
SW-846 6010	7439-97-6	Mercury	3.31
SW-846 8260	75-09-2	Methylene chloride	13.61
SW-846 6010	7439-98-7	Molybdenum	4.60
SW-846 8260	91-20-3	Naphthalene	17.34
SW-846 6010	7440-02-0	Nickel	10.53
SW-846 6010	7782-49-2	Selenium	3.51
SW-846 6010	7440-22-4	Silver	4.49
SW-846 6010	7440-24-6	Strontium	2.22
SW-846 8260	100-42-5	Styrene	15.76
SW-846 8260	127-18-4	Tetrachloroethene	15.83
SW-846 6010	7440-31-5	Tin	2.47
SW-846 8260	108-88-3	Toluene	11.18
SW-846 8260	10061-02-6	trans-1,3-Dichloropropene	11.76
SW-846 8260	79-01-6	Trichloroethene	14.21
SW-846 6010	11-09-6	Uranium, Total	4.40
SW-846 6010	7440-62-2	Vanadium	13.20
SW-846 8260	75-01-4	Vinyl chloride	44.49
SW-846 8260	1330-20-7	Xylene	15.00
SW-846 6010	7440-66-6	Zinc	9.43

Field Duplicate Evaluation

Field duplicate help evaluate sampling precision, or overall repeatability of the sampling process. The frequency of field duplicate collection should exceed 1 field duplicate per 20 real samples, or 5 percent across the ER Project. Table 13 indicates that duplicate frequencies exceeded the project goal with respect to all analytical test methods.

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Table 13
Field Duplicate Sample Frequency Summary

Test Method Name	Number of Real Samples	Number of Duplicate Samples	% Duplicate Samples
Alpha Spectroscopy	4	4	100.00%
Gamma Spectroscopy	38	5	13.16%
SW-846 6010	38	5	13.16%
SW-846 8260	38	5	13.16%

Duplicate sample RPDs indicate how much variation exists in the analytical results. The EPA data validation guidelines state "there are no required review criteria for field duplicate analyses comparability" (EPA 1994b). For the DQA, the highest maximum RPDs (greater than 35 percent) are normally reviewed. Analytes with the highest maximum RPDs are further evaluated by comparing maximum analytical results with the WRW AL. If the highest sample concentration is sufficiently below the AL (less than 10 percent), no further action is required. Duplicate sample RPDs are provided in Table 14. For this project, none of the corrected numbers were greater than the action level; therefore, project decisions were not impacted.

Table 14
Duplicate Relative Percent Difference Summary

Lab Code	Test Method	Analyte	Max of Result RPD
ESTLDEN	SW-846 8260	1,1,1-Trichloroethane	5.31
ESTLDEN	SW-846 8260	1,1-Dichloroethane	5.31
ESTLDEN	SW-846 8260	1,2,4-Trichlorobenzene	5.31
ESTLDEN	SW-846 8260	1,2-Dichloroethane	5.31
ESTLDEN	SW-846 8260	4-Methyl-2-pentanone	4.65
ESTLDEN	SW-846 6010	Aluminum	61.90
ESTLDEN	SW-846 6010	Arsenic	34.78
ESTLDEN	SW-846 6010	Barium	66.67
ESTLDEN	SW-846 8260	Benzene	5.31
ESTLDEN	SW-846 6010	Beryllium	23.33
ESTLDEN	SW-846 8260	Bromodichloromethane	5.31
ESTLDEN	SW-846 8260	Bromoform	5.31
ESTLDEN	SW-846 8260	Carbon Disulfide	5.31
ESTLDEN	SW-846 8260	Chlorobenzene	5.31
ESTLDEN	SW-846 8260	Chloroform	5.31
ESTLDEN	SW-846 6010	Chromium	96.00
ESTLDEN	SW-846 8260	cis-1,3-Dichloropropene	5.31
ESTLDEN	SW-846 6010	Cobalt	89.36
ESTLDEN	SW-846 6010	Copper	95.08
ESTLDEN	SW-846 8260	Dibromochloromethane	5.31
ESTLDEN	SW-846 6010	Iron	47.42
ESTLDEN	SW-846 6010	Lead	65.63
ESTLDEN	SW-846 6010	Lithium	81.48
ESTLDEN	SW-846 6010	Manganese	130.03
ESTLDEN	SW-846 6010	Mercury	81.25
ESTLDEN	SW-846 8260	Methylene chloride	5.31
ESTLDEN	SW-846 8260	Naphthalene	5.31
ESTLDEN	SW-846 6010	Nickel	76.32

Lab Code	Test Method	Analyte	Max of Result RPD
ESTLDEN	SW-846 6010	Strontium	90.00
ESTLDEN	SW-846 8260	Styrene	5.31
ESTLDEN	SW-846 8260	Tetrachloroethene	5.31
ESTLDEN	SW-846 8260	Toluene	22.68
ESTLDEN	SW-846 8260	trans-1,3-Dichloropropene	0.00
ESTLDEN	SW-846 8260	Trichloroethene	1.87
GEL	Alpha Spectroscopy	Uranium-234	39.17
GEL	Alpha Spectroscopy	Uranium-238	49.62
ESTLDEN	SW-846 6010	Vanadium	38.46
ESTLDEN	SW-846 6010	Zinc	85.71

5.2.3 Completeness

Based on original project DQOs, a minimum of 25 percent of Environmental Restoration (ER) Program analytical (and radiological) results must be formally verified and validated. Of that percentage, no more than 10 percent of the results may be rejected, which ensures that analytical laboratory practices are consistent with quality requirements.

The number and percentage of validated records (codes without "1"), the number and percentage of verified records (codes with "1") for each analyte group are shown in Table 15. No records were rejected. Because the frequency of validation is within project quality requirements and in compliance with the RFETS validation goal of 25 percent of all analytical records the results indicate that these data are adequate.

Table 15
Verification and Validation Summary

Validation Qualifier Code	Total of CAS Number	Alpha Spectroscopy	Gamma Spectroscopy	SW-846 6010/6010B	SW-846 8260
No V&V	414	0	0	414	0
J	93	0	0	93	0
J1	1	0	0	0	1
UJ	22	0	0	15	7
UJ1	2	0	0	0	2
V	1207	10	60	352	785
V1	781	10	54	0	717
Total	2520	20	114	874	1512
Validated	1322	10	60	460	792
% Validated	52.46%	50.00%	52.63%	52.63%	52.38%
Verified	784	10	54	0	720
% Verified	31.11%	50.00%	47.37%	0.00%	47.62%

Notes: **Validated qualifiers:** J = estimated, JB = estimated with possible laboratory contamination, UJ = estimated detection limit, V = validated

Verified qualifiers: J1 = estimated, JB1 = estimated with possible laboratory contamination, UJ1 estimated detection limit, V1 = verified

5.2.4 Sensitivity

Reporting limits, in units of micrograms per kilogram (ug/kg) for organics, milligrams per kilogram (mg/kg) for metals, and picocuries per gram (pCi/g) for radionuclides, were compared with proposed RFCA WRW ALs. Adequate sensitivities of analytical methods were attained for all COCs that affect project decisions. "Adequate" sensitivity is defined as an RL less than an analyte's associated AL, typically less than one-half the AL.

5.3 Summary of Data Quality

RPDs greater than 35 percent indicate the sampling precision limits of some analytes have been exceeded. No records were rejected. Compliance with the project quality requirements and RFETS validation goal of 25 percent of all analytical records indicates these data are adequate. If additional V&V information is received, IHSS Group 400-2 records will be updated in the SWD. Data qualified as a result of additional data will be assessed as part of the CRA process. Data collected and used for IHSS Group 400-2 are adequate for decision making.

6.0 REFERENCES

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Figure 1
IHSS Group 400-2
(UBC 440)
Location Map

KEY

	UBC Site
	Demolished Structure
	Structure
	Paved area
	Dirt road
	Stream, ditch, or other drainage

Scale
 200 0 200 400 Feet
 Scale = 1 : 6,000
 State Plane Coordinate Projection
 Colorado Central Zone
 Datum: NAD 27

U.S. Department of Energy
 Rocky Flats Environmental Technology Site

Prepared by:
RADMS

Prepared for:

KAISER-HILL
 COMPANY

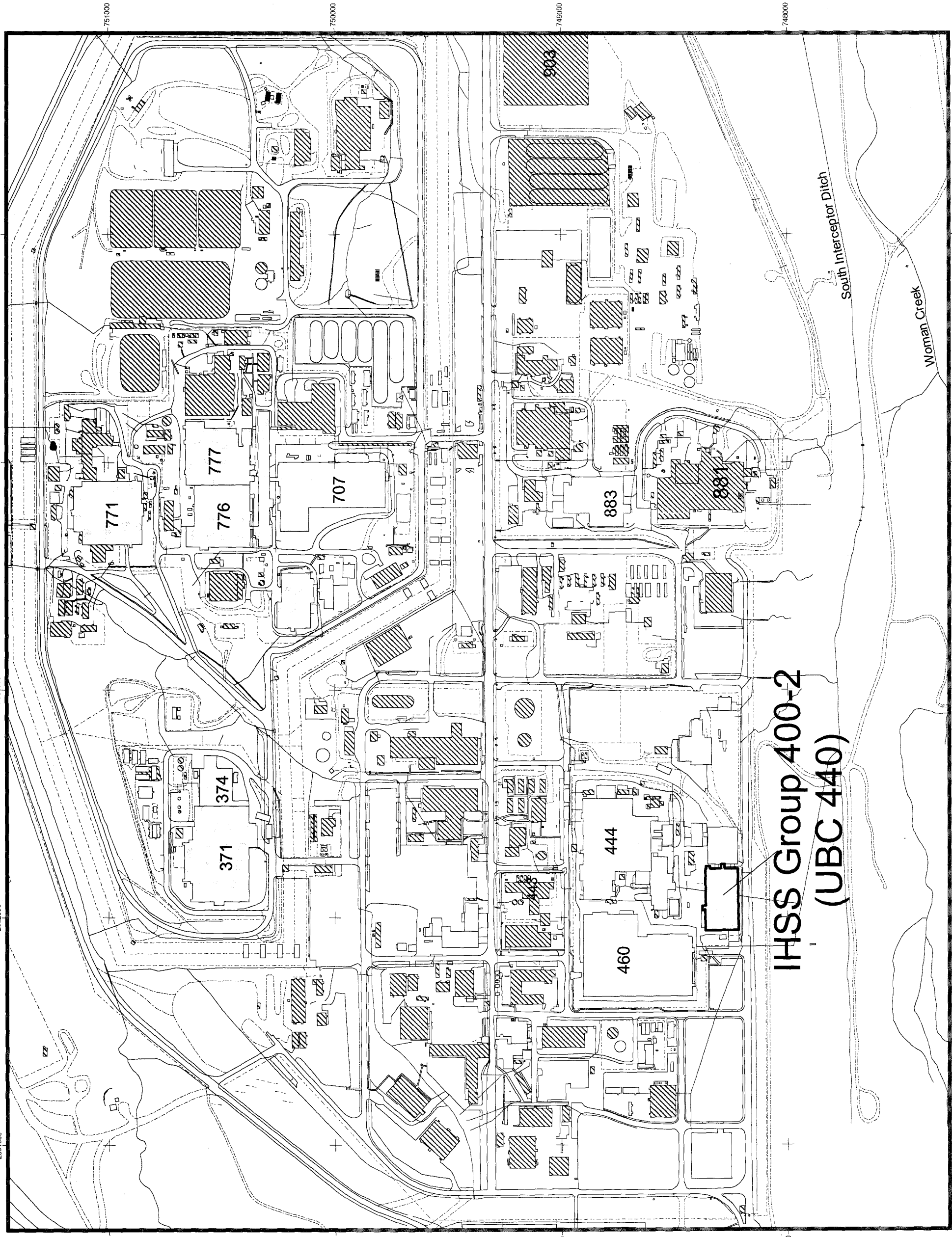


Figure 2

UBC 440
Accelerated Action
Surface Soil Results
Greater Than Background
Means Plus Two Standard
Deviations or RLS

KEY

- Detected below action levels
- Detected below background means plus two standard deviations or RLS
- UBC Site
- Demolished Structure
- Structure
- Paved area
- Dirt road
- Stream, ditch, or other drainage



Scale = 1 : 800

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

RADMS

Prepared for:



KAISER-HILL
COMPANY

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September 2004

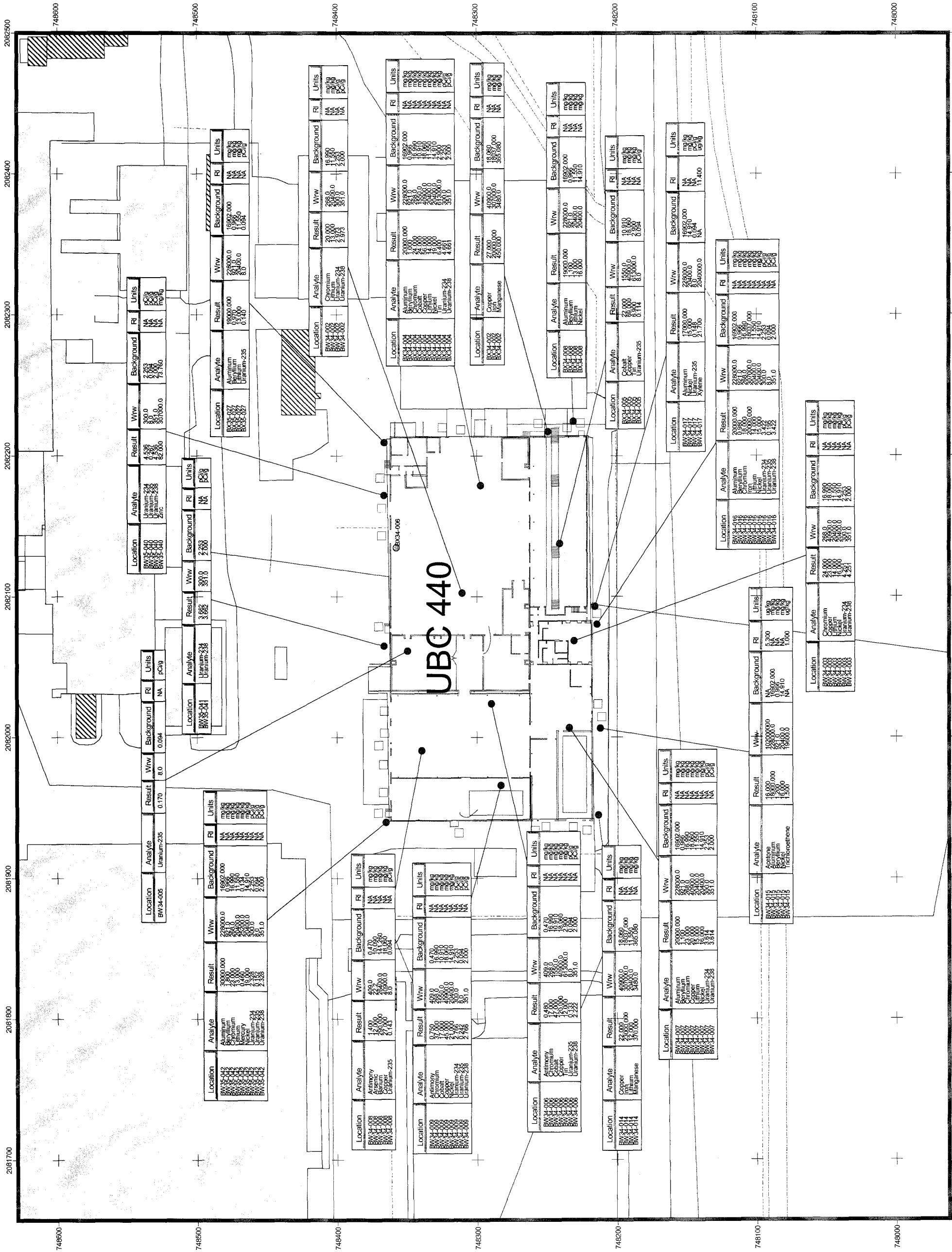








Figure 3

**UBC 440
Accelerated Action
Subsurface Soil Results
Greater Than Background
Means Plus Two Standard
Deviations or R_Ls**

KEY

- | | |
|---|---|
| ○ | Detected above WRW AL |
| ● | Detected below action levels |
| ○ | Detected below background means plus two standard deviations or RLs |
|  | UBC Site |
|  | Demolished Structure |
|  | Structure |
|  | Paved area |
|  | Dirt road |
|  | Stream, ditch, or other drainage |

2



Scale = 1:800

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD 27

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